

CLAIMS

1. A method of treating a bone abnormality in a body comprising the following steps:

exposing an area of bone having an abnormality;

5 forming at least one cavity in the bone, wherein a portion of the at least one cavity defines an opening;

inserting an expandable, empty fabric bag into the at least one cavity through the opening, the bag being formed of a fabric wall that includes a plurality of bag openings between about 0.25 to about 5.0 mm in diameter, the bag defining an interior and having

10 an exterior;

packing the bag through a fill opening with material that will support or promote bone growth through the fabric wall, the packing causing said bag to expand until the bag and material combination form a self-retaining rigid shape wherein the exterior of the bag is substantially in contact with the bone of the cavity, the plurality of bag openings

15 constructed and arranged to substantially prevent the material from passing from the interior of the bag to the exterior of the bag; and

closing said fill opening to prevent loss of the material from the bag interior.

2. The method of claim 1 wherein the bone abnormality is selected from a member

20 of the group consisting of: bone tumors, cysts, avascular necrosis of the femoral head, tibial plateau fractures, compression fractures of the spine and any combination thereof

3. The method of claim 1 wherein the area of bone is a vertebra, the vertebra comprising at least one compression fracture.

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4. The method of claim 1 wherein the area of bone is a femoral head, the femoral head comprising an avascular necrosis.

5. The method of claim 1 wherein the area of bone is a tibial plateau, the tibial 30 plateau comprising at least one fracture.

6. The method of claim 1 wherein when packing the bag with the material, the fill opening has a diameter of between about 0.25 to about 5.0 mm in diameter.

7. The method of claim 1 wherein when packing the bag with the material, the fill opening has a diameter greater than the diameter of the plurality of bag openings, after the bag is packed with fill material the diameter of the fill opening is at least as small as the diameter of the plurality of bag openings.

8. The method of claim 7 wherein the fill opening has a diameter of between about 3 mm to about 1 cm.

9. The method of claim 1 wherein the fill opening is characterized as self-closing.

10. The method of claim 1 wherein formation of the cavity comprises the following 15 steps:

boring into the area of the bone to form the opening;
inserting a reamer tool into the opening; and
excising out a quantity of bone from the area with the reamer tool, the quantity of bone being sufficient to form the cavity.

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11. The method of claim 1 wherein formation of the cavity comprises the following steps:

boring into the area of the bone to form the opening;
inserting an expandable compaction member into the opening; and
25 inflating the compaction member thereby compacting a quantity of bone, the quantity of bone being sufficient to form the cavity.

12. The method of claim 11 wherein the expandable compaction member is the fabric bag.

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13. The method of claim 1 further comprising the following steps:

disposing the fabric bag about a body adapted to assume a collapsed geometry for deployment into the bag, the body being expandable to an expanded geometry for compacting cancellous bone; and

5 expanding the body within the bag, the expansion of the body expanding the bag.

14. The method of claim 13 comprising the additional step of:

removing the body from the bag after the body is expanded to the
10 expanded geometry.

15. A method of treating one or more compression fractures in a vertebra comprising the following steps:

exposing an area of the vertebra having the one or more compression fractures;

15 boring at least one opening into the vertebra;

forming at least one cavity in the vertebra, wherein a portion of the at least one cavity defines the opening;

20 inserting an expandable, empty fabric bag into the at least one cavity through the opening, the bag being formed of a fabric wall that includes a plurality of bag openings between about 0.25 to about 5.0 mm in diameter, the bag defining an interior and having an exterior;

25 packing the bag through a fill opening with material that will promote bone growth through the fabric wall, the packing causing said bag to expand until the bag and material combination form a self-retaining rigid shape wherein the exterior of the bag is substantially in contact with vertebral bone of the cavity, the plurality of bag openings constructed and arranged to prevent the material from passing from the interior of the bag to the exterior of the bag; and

closing said fill opening to prevent loss of the material from the bag interior.

30 16. The method of claim 15 wherein the cavity is formed by reaming or compacting cancellous bone of the vertebra.

17. A method of treating avascular necrosis of a femoral head comprising the following steps:

exposing an area of the femoral head having avascular necrosis;

boring at least one opening into the femoral head;

5 forming at least one cavity in the femoral head, wherein a portion of the at least one cavity defines the opening;

inserting an expandable, empty fabric bag into the at least one cavity through the opening, the bag being formed of a fabric wall that includes a plurality of bag openings between about 0.25 to about 5.0 mm in diameter, the bag defining an interior and having

10 an exterior;

packing the bag through a fill opening with material that will promote bone growth through the fabric wall, the packing causing said bag to expand until the bag and material combination form a self-retaining rigid shape wherein the exterior of the bag is substantially in contact with bone of the cavity in the femoral head, the plurality of bag

15 openings constructed and arranged to prevent the material from passing from the interior of the bag to the exterior of the bag; and

closing said fill opening to prevent loss of the material from the bag interior.

18. The method of claim 17 wherein the cavity is formed by reaming or compacting
20 cancellous bone of the femoral head.

19. A method of treating a tibial plateau having one or more fractures, comprising the following steps:

exposing an area of the tibial plateau having one or more fractures;

25 boring at least one opening into the tibial plateau;

forming at least one cavity in the tibial plateau, wherein a portion of the at least one cavity defines the opening;

inserting an expandable, empty fabric bag into the at least one cavity through the opening, the bag being formed of a fabric wall that includes a plurality of bag openings between about 0.25 to about 5.0 mm in diameter, the bag defining an interior and having
30 an exterior;

packing the bag through a fill opening with material that will promote bone growth through the fabric wall, the packing causing said bag to expand until the bag and material combination form a self-retaining rigid shape wherein the exterior of the bag is substantially in contact with bone of the cavity within the tibial plateau, the plurality of 5 bag openings constructed and arranged to prevent the material from passing from the interior of the bag to the exterior of the bag; and

closing said fill opening to prevent loss of the material from the bag interior.

20. The method of claim 19 wherein the cavity is formed by reaming or compacting 10 cancellous bone of the tibial plateau.

21. A device for compacting cancellous bone comprising:
an inner layer and an outer layer, the outer layer defining a flexible material which at least partially surrounds the inner layer, the inner layer defining an elastomeric 15 body, the outer layer including a plurality of pores which extend therethrough, the inner layer and outer layer combination define an expandable body adapted to assume a collapsed geometry for deployment into bone and an expanded geometry for compacting cancellous bone to form a cavity, the inner layer defining a substantially hollow chamber, the inner layer and outer layer defining at least one opening, the expandable body 20 constructed and arranged to expand from the collapsed geometry to the expanded geometry when a predetermined amount of fill material is placed within the substantially hollow chamber through the at least one opening, the outer layer constructed and arranged to prevent penetration of the inner layer by the cancellous bone encountered during expansion of the expandable body.

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22. The device of claim 21 wherein the inner layer is a medical balloon.

23. The device of claim 22 wherein the medical balloon is at least partially 30 constructed from at least one member of the group consisting of: latex, thermoplastic elastomers, urethanes, and any combination thereof.

24. The device of claim 21 wherein the outer layer is an expandable mesh bag.